

History of the Central Great Plains Research Station



includes publication list



History of the Central Great Plains Research Station

David C. Nielsen, B.W. Greb, Merle F. Vigil, and R. Mickelson

(currently referred to as Building No. 3) which were constructed in 1914.

Windbreak studies were first planted in 1909-1911 and further plantings were made in 1935-1936. Six experiments were planted which included evaluations of 26 species. The Ponderosa pine windbreak running north and south along County Road GG is a remnant of the 1935-1936 planting. An extensive fruit garden planting was made from 1909 to 1914 that produced encouraging results regarding pie cherry, apple, plum, and pear production. Field shelterbelt experiments were initiated in 1946, with a shelterbelt 70' by 612 ft made up of Ponderosa pine and Rocky Mountain Juniper. Many of the orchard trees had succumbed to diseases by 1957, and most were removed at that time.



Horse Barn

The first rotation experiments were established in 1909. They were part of rotation studies conducted by the Office of Dry-Land Agriculture Investigations of the USDA's Bureau of Plant Industry at 24 Great Plains locations. Crops included in these rotation experiments at Akron were winter wheat, spring wheat, oats, barley, corn, kafir, milo, sorgo, rye, peas, sweet clover, and alfalfa.

Officially the station became the U.S. Akron Field Station and now, as the Central Great Plains Research Station, is one of only four remaining federal field research stations in the Great Plains (the other three are in Sidney, MT; Mandan, ND; and Bushland, TX).

Mr. Payne resigned in March 1910, and the superintendent duties were taken over by O.J. Grace.



O.J. Grace and "Hound Dawg", 1910

Both the Cereal and Forage Offices of the USDA maintained research personnel at the station beginning in 1908. Individuals working on those cereal and forage investigations included W.C. Shelley, A.D. Dillman, H.N. Vinall, F.E. Thompson, Charles H. Clark, George A. McMurdo, F.A. Coffman, and J.J. Curtis. The Dryland Investigations office of the Department of Agriculture also maintained a scientific researcher at the station for many years. Among those holding this position were A.E. Seamans, W.M. Osborne, N.L. Jensen, and J.F. Brandon.



F.A. Coffman, cereal nursery, 1921

done. O.J. Grace established a sheep grazing experiment in 1919, and studies that investigated hog and lamb fattening, and cow-calf production studies were later run. Following World War II, Lewis Kundert was employed at the research station, first working as a farm hand for Colorado A&M College managing the livestock experiments for three years, and then working for the Bureau of Plant Industry (which would become the Agricultural Research Service). The livestock experiments first involved fattening steers, and later cow/calf nutrition. Many head of cattle were lost during the New Years blizzard of 1949 that lasted three days. Many people were stranded on US Highway 34 during that blizzard and a number of families stayed at the station until the road re-opened.



Cow-Calf production study, ~1950



Pat, MaryAnn, and Tom Kundert, 1949

Many of the station employees lived on the station with their families during the first half of the station's existence. Station employees raised potatoes, carrots, squash, pinto/navy beans for their families. Some of the children that lived on the station attended the Star School, located three miles north and east of the station. Some of the families living on the station were Payne, Grace, Brandon, Johnson, Kuntz, McKie, Shook, Pixler, Hodges, Curtis, Reece, Parker, Callahan, Coffman, Greb, Kundert, and Florian. By the early 1960s there were no individuals or families residing on the station.

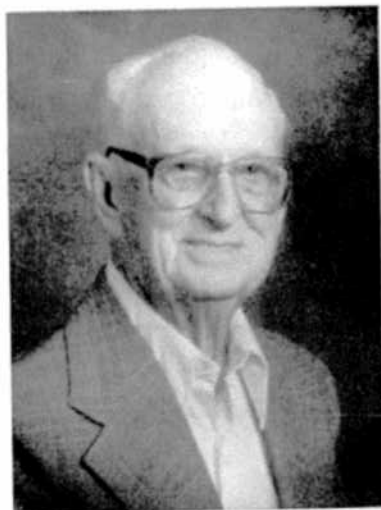
The need for additional personnel and funding to research agricultural production systems for the unique soils and climates of the Central Great Plains have always been priorities for the station administration. In the 1951 annual report, superintendent J.F. Brandon wrote, "Due to the findings of this station, located right in the High Plains, that the region is governed by an entirely different set of environmental conditions than maintain over the other portions of the Great Plains area, it is no less than colossal that the Bureau does not maintain more research workers here. The station enjoys good cooperation with the Cereal, Horticultural, and Forage Divisions of the U.S. Department located in Beltsville. It also has good cooperation with the Agronomy, Horticultural, Range Management, and the Animal Husbandry Departments of the State Agricultural College at Fort Collins. However, none of these provide any financial aid..."



J.F. Brandon

Research emphasis changed in 1953 with the creation of the Agricultural Research Service, a research agency within USDA. Up to this time, research emphasis had been placed on breeding of and cultural studies for cereal and forage crop production. Animal nutritional studies were no

and other citizens whom it is designed to serve either directly or indirectly. It must be operated on a program growing from the suggested needs of these Great Plains and not the reverse. Farmers', ranchers', and other citizens' opinions, suggestions, and agricultural needs are most valuable and if properly interpreted into research that serves these needs, this station can go forward, expand and endure."



In 1956 agricultural engineer Maurice B. Cox transferred to Akron from Guthrie, OK. In 1957 J.F. Brandon transferred to Fort Collins, and Cox was appointed acting superintendent. Brandon had been at the Akron station since 1920. A 50th anniversary celebration was held June 28, 1957, with 220 in attendance. Brandon was recognized for 40 years of service.

In 1958, Cox began construction of the five level pans used for studies in water harvesting. The size of the pans varied from 2.5 to 6.6 acres, with

contributing watersheds varying from 18 to 360 acres. The pans were constructed using both wheel and track tractors and a scraper. Pans were leveled to zero grade and smoothed with a land plane. Dikes were constructed around each pan, and flumes installed at both upper and lower ends of each pan to measure inflow and outflow.



Level basin pan and flume, 1964

In 1958 the old horse barn (Building 3) was remodeled into an exhibition hall and community meeting place. The wheat variety trials were moved to their current location south of US Highway 34. Also in 1958 C.E. Johnson took over the superintendent duties, and Wayne Shawcroft and William Fryrear joined the staff as student trainees. F.W. Frazier began duties at the station as a CSU agronomist.

The United States Senate Committee on Appropriations to the USDA requested a study of facility needs for research on soil and water problems In 1958. The Secretary of Agriculture appointed representatives of state and federal research agencies, farm organizations, lay groups, and individual farmers to a special committee to conduct this study. Their findings were published as Senate Document 59, 86th Congress, and entitled "Facility Needs – Soil and Water Conservation Research", and would later impact the development of the station.

C. Everett Johnson, a cattle rancher from Gunnison, was asked by Omer Kelly (an ARS administrator) to come and serve as station superintendent in 1958. Everett was not trained as a scientist, but had a lot of ideas, some coming from time he had served on foreign assignments in India. He started



C.E. Johnson

Greg Hinze began work for Colorado State University at the research station in 1961, taking over the duties of Dr. F.W. Frazier. He was assisted by technician, Rudean (Dean) Severin, and secretary Imogene (Jeanie) Goodman. While at the research station Greg worked primarily with wheat and millet. Working with CSU wheat breeders Byrd Curtis and later Jim Welsh, Greg helped evaluate selections for new varieties. Greg was a breeder of millets, working mostly with proso and foxtail, but also with some pearl millet varieties. Most of the releases he made were from material found in the world collection obtained from the US Plant Introduction stations. Technicians Dean Severin and Bob Florian were very involved in equipment construction for the breeding program, including development of their own cone planter which permitted much of the extensive plot work that Greg was involved in. Greg left the station in 1981 to pursue other interests.

Orville E. Hays became station superintendent on May 30, 1963 when he transferred from LaCrosse, WI. He thought they should have a pond on the station to supply an emergency water supply for fire fighting and for aesthetic reasons, so the employees built a dam across the area east of the current shop building where the gasoline/diesel tanks now stand. They packed the floor of the pond to limit infiltration of water. Water was pumped into the pond several times but it would always drain out. Hays retired in 1965. Frank Rauzi, a range scientist from Cheyenne, served as interim superintendent for about 7 months after Hays' retirement.



O.E. Hays

A major interdisciplinary micrometeorological study of grain sorghum was conducted in the summers of 1966 and 1967, known locally as the "Akron Safari". Harwell Allen brought a trailer from Cornell University with instrumentation to log the carbon dioxide and water use fluxes, and air temperature profiles. Lysimeters were installed to measure crop water use. John Hanks was in charge of the energy balance measurements; Arnold Klute, Herbert Gardner, and Wilford Gardner were in charge of the soil water measurements; Harwell Allen oversaw the carbon dioxide flux measurements; and others made measurements of stomatal conductance and leaf water potential. Arnold Klute and Herb Gardner were both soil physicists with the ARS in Fort Collins with John Hanks the research leader of that group. Herb built an instrument to measure the soil heat flux component of the energy balance. He also worked with Dr. Klute and Dr. Wilford Gardner in detailed soil water tension and water flux measurements.

In 1967 Wally Greb and Darryl Smika (stationed at North Platte, NE) established an experiment to evaluate herbicides for no-till weed control during fallow. It was modeled after an experiment that Darryl had started in 1962 in North Platte. The Akron experiment continues today and is known as the Long-Term Tillage plots (LTT). It is one of several sites in a network across the U.S. and Canada for long-term experiments in North America. The experiment provides critical information regarding long-term changes in soil carbon, organic matter, and other soil properties as affected by tillage and no-tillage after 40 years of continuous management.

One of the priorities identified in 1958 in Senate Document 59 called for construction of a modest office and laboratory building in the west Central Great Plains area with headquarters near Akron, CO. On 1 March 1970 at the Senate Hearings before the Committee on Appropriations for USDA, Akron was in line to receive funding for planning and construction of

The year 1976 also saw the installation of 20 acres of solid set irrigation on the west side of the station. This area has been used extensively to determine water use/yield production functions for many different crop species by using the solid set irrigation system to apply gradient irrigations.

To address the research question of the effect of growth stage sensitivity to water stress and effects on crop yield, a rainout shelter was constructed in August 1981. The shelter automatically moves on rails when precipitation is detected, thereby covering a 30 by 30 foot area in which various water treatments are applied. This allows for precise application of the water treatments, regarding both timing and amount of water applied. Crops that have been tested for growth stage sensitivity to water stress include winter wheat, spring wheat, mustard, canola, camelina, foxtail millet, kenaf, dry bean, and soybean.

Minutes of the station advisory committee indicate that the first discussions regarding the need for a weed scientist and a plant physiologist occurred in 1978. ARS administrators concurred with that assessment, and in 1982 weed scientist Randy Anderson joined the staff. Randy had previously been a weed scientist with Montana State University in Sidney, MT. During Randy's 18 years at the station he made significant contributions to our knowledge and understanding of the ecology of weed species, and management systems that controlled weeds, both with and without herbicide use. Much of Randy's work quantified weed seed survival in the wheat-fallow system and documented the value of rotations for controlling winter annual grasses in winter wheat. He also continued research into production systems for proso millet initiated by Wally Greb. From 1995 to 2000 Randy served as Research Leader at the station.



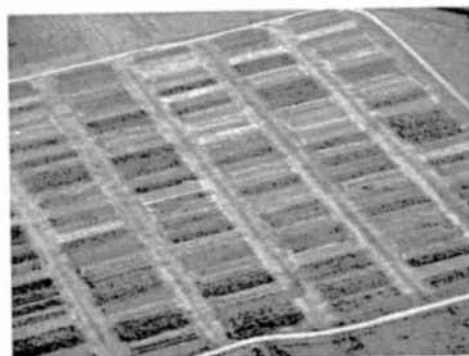
Randy Anderson

Bohn Dunbar was hired as a research agronomist specializing in crop physiology in 1979 with the stipulation that he would complete studies and work at CSU resulting in the Ph.D. degree. That degree was granted in 1982. Bohn developed an immunoassay for determining residual atrazine levels in the soil, and conducted studies of freezing effects on coleoptile tiller survival in winter wheat and lupine production methods. Bohn resigned in 1988.

John Shanahan joined the staff in 1982 filling the CSU research and extension position vacated the previous year by Greg Hinze. John had recently received his Ph.D. from the CSU Agronomy Department, and began work on identifying adapted varieties (wheat, corn, millet, etc.), developing more diverse cropping schemes, improving water and nutrient use efficiency, and delivering new developed practices to producers in the Great Plains environment. In February 1986 John was transferred to the CSU campus in Fort Collins but continued with collaborative research and directing graduate student research at the station until he joined the ARS in Lincoln, NE in 1998.

Another significant change in scientific staff took place in the late summer of 1983. At that time the ARS research station in Sidney, MT was threatened to be closed, and staff were being sent to other locations. Dr. Ardell Halvorson, soil scientist, and support scientist, Curtis Reule, along

During the fall of 1990 the scientific staff of the station (Ardell Halvorson, Randy Anderson, David Nielsen, and Steve Hinkle) in consultation with local area farmers (most prominently Gilbert Lindstrom) planned a new long-term alternative crop rotation experiment (ACR). The objectives were to determine optimum dryland crop sequences by monitoring yield, water use, plant growth and development, soil fertility, and soil chemical and physical properties as influenced by cropping frequency and crop order. The primary crops investigated were winter wheat, corn, proso millet, and sunflower. There were also a set of plots that looked at evaluating decision rules for flexible crop selection based on crop yield estimated from available soil water at planting and an assumed level of growing season precipitation. Twenty fixed rotational sequences and four flexible cropping systems are included in the experiment which consists of 198 plots in which every phase of every rotation is replicated three times. The crop rotation study continues today providing a wealth of information on crop responses to soil water and fertility, changes in soil physical and chemical parameters with crop sequencing, and crop phenological and biomass development. The data are valuable for verifying computer simulation models which can extend the results of the station research to other climates and soil types.



Alternative Crop Rotation Study

A reorganization of ARS units in Fort Collins occurred in 1991 in which the Hydroecosystems Research Unit was dissolved. As a result, the soil chemist from that unit, Dr. Rudy Bowman, and Support Scientist Bill Beard were transferred to Akron. Rudy brought with him expertise in the chemistry of soil phosphorus and continued that work at Akron as he looked at changes in soil quality due to crop rotational sequences. Rudy Bowman retired from the station in 2001. As part of the re-organization, a vacant position was transferred to Akron, making it possible to hire Dr. Merle Vigil as a soil scientist. Until his retirement in 1995, Bill Beard worked with Merle on experiments to evaluate dryland canola production in the region and with experiments to measure greenhouse gas fluxes in alternative no-till cropping systems. Merle came to the station from the University of Nebraska where he was employed as an assistant professor in the Agronomy Department and as an ARS postdoctoral research associate. As part of Merle's work with canola, he documented the base temperature for emergence of that crop. He then worked to establish the nitrogen requirements for various dryland crops, particularly sunflower, wheat, and corn. Together with David Nielsen, Merle has worked on legumes as an alternative crop and with several residue management issues in dryland no-till cropping systems. After serving one year as the acting research leader in 2000 following Randy Anderson's transfer to Brookings, SD, he accepted the research leader position in 2001, and currently serves the research unit in that capacity.



Rudy Bowman & Merle Vigil

and methods to alleviate compaction. This has led to the development and understanding of the least limiting water concept as a method of soil physical condition scoring. Joseph also conducts research on the influence of soil physical properties on root growth and crop production and also investigates soil management methods and uses of technology to improve the soil physical environment.

The Colorado State University Crops Testing program has been ongoing since the 1950s. CSU permanently stationed a technician (Jim Hain) in Akron in 1996 to oversee, establish, and manage crops testing at a variety of locations throughout eastern Colorado. Plant breeders involved in the Crops Testing program over the years have been Byrd Curtis, James Welsh, James Quick, and Scott Haley. The Crops Testing Program is currently under the direction of Jerry Johnson.

Dennis Kaan was hired by Colorado State University in 1997. He was located at the research station as the Golden Plains Area extension agricultural economics specialist. His work centered on developing cost of production information and in analysis of enterprise budgets for the region. A few years later he accepted the position of Golden Plains Area director with his office located in the Washington County Courthouse Annex in Akron.

In 1997 the Natural Resources Conservation Service stationed a Soil Quality Team at the research station. That team was comprised of Mike Sucik (soil scientist), Josh Saunders (range scientist), and Manuel Rosales (agronomist/plant scientist). The small office building just north of the main office/laboratory building was brought in to house the team. With Akron as their base, they traveled throughout a five-state region disseminating information on practices that would enhance soil quality and minimize degradation and loss of the soil resource. The team was highly effective in transferring some of the most current research findings and technology throughout the Great Plains. A re-organization within NRCS formally ended the soil quality team in 2000, and over a period of several years all three members of the team transferred into positions at other locations.

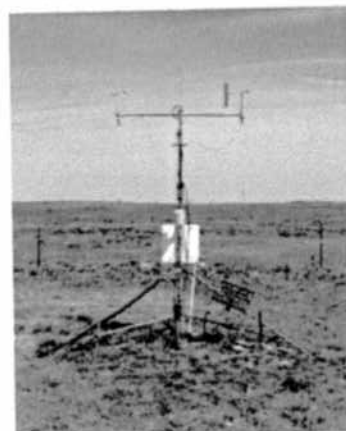


Josh Saunders demonstrating Soil Quality Kit

The Agricultural Research Service, Natural Resources Conservation Service, and Colorado State Forest Service cooperated in 1997 to establish a windbreak arboretum in the area between the shop and U.S. Highway 34. The arboretum has plantings of many different trees and shrubs to demonstrate the dryland establishment and growth of potential windbreak plantings. Species included in the demonstration planting are ponderosa pine, scotch pine, Austrian pine, piñon pine, Colorado blue spruce, white fir, Douglas fir, bristlecone pine, lacebark elm, Siberian elm, red cedar, juniper, black locust, honey locust, green ash, hackberry, burr oak, Russian olive, mulberry, Osage orange, honeysuckle, chokecherry, carogana, lilac, plum, buffaloberry, cotoneaster, golden current, Nanking cherry, sand cherry, sumac, and wood rose.

Randy Anderson accepted the position of director of the Northern Grain Insects Research Laboratory in Brookings, SD in 2000. Dr. Brien Henry, a recent graduate of Mississippi State

years until his retirement in 2001. An automated weather station was installed near the other weather instrumentation in 1983 as part of the network of automated stations accessed by the High Plains Regional Climate Center in Lincoln, NE. The automated station records air and soil temperatures, relative humidity, solar radiation, wind speed, and wind direction every minute and saves computed hourly averages. Hourly precipitation sums are also saved. The data are available on a near-real time basis via internet access through the High Plains Regional Climate Center website.



Automated Weather Station

Originally the pan evaporation data at the weather station were collected from a Bureau of Plant Industry sunken evaporation pan, but in 1967 a Class A above-ground evaporation pan was installed. Measurements were taken from both pans through 1985, and in 1986 the sunken pan measurements were discontinued.

In 1989 the National Lightning Detection Network (initially established by the State University of New York in Albany) located equipment on the station to monitor the location, intensity, and frequency of lightning strikes. This site is one of over 100 lightning monitoring locations in the United States. The data are collected continuously and downloaded via satellite to Vaisala Measurement Systems in Tucson, AZ.

A dedicated support staff has been comprised of many individuals throughout the years that included Rob Aiken, Ginger Allen, Deanna Annand, Bob Bach, Llewellyn Bass, Bill Beard, Lynn Bixler, Kendra Brandner, Carolyn Brandon, Caralee Burnett, Paul Campbell, Melissa Castillo, Jim Chum, Tim Clark, Karen Couch, Kirk Cummings, Jane Dailey, Alicia Davisson, Donna Diamond, Katie Drullinger, Ken Fetzer, Bonnie Fisher, Bob Florian, Donna Fritzler, Betty Golden, Jeanie Goodman, Wendale Graves, Rory Greenway, Jim Hain, Linda Hardesty, Cody Hardy, Michele Harms, Herb Shafer, Stephanie Hill, Butch Horner, Cory Huxoll, Rosalie Jefferson, Harold Johnson, Cindy Johnson, Eric Keane, Dave Kennedy, Delbert Koch, Marietta Koch, Mike Koch, Lew Kundert, Hubert Lagae, Maurine Lane, Tim Lindahl, Llewellyn Bass, Arnold Page, David Parker, Mike Pappas, Brandon Peterson, Linda Pieper, Matt Pieper, Bill Pixler, Stacey Poland, Dave Poss, Kurt Reule, Bruce Riggle, Cindy Roth, Anna Searl, Dean Severin, Packy Schafer, Anna Shannon, Dallas Spellman, Gene Uhler, Dee Webb, Lois West, Bridgette White, Lori Zeihr, Jim Zizz, and many, many summer students and graduate students.

Over the past 100 years the Central Great Plains Research Station has truly become the "Agricultural Fact Finding Institution" that was its original founding purpose. Studies have been conducted to provide both basic and applied research results to farmers, ranchers, extension specialists, agronomic consultants, and scientists in the Great Plains region and throughout the world where semi-arid climates exist. The entire staff continue to be anxiously engaged in learning and sharing new knowledge that will benefit the economic and environmental well-being of agriculture by development of integrated cropping systems and technologies for maximum utilization of soil and water resources.

Crop rotation and sequencing

Alternative crops evaluations

Russian wheat aphid control

Herbicide efficacy

Crop residue effects on soil surface wind speed, erosion potential, and precipitation storage

Crop residue decomposition

No-till dryland crop rotation management

Cropping system simulation modeling

Appendix 2, Memories of James Bruncker as published in the Akron News-Reporter, Akron, CO, Thursday, 10 March 1932

THE U.S. EXPERIMENT STATION AT AKRON By James Bruncker

As I wish to pass on to future settlers on the great plains the local history of the station while Father Time whets his sickle, I am now writing this article.

In the year 1892, October 18th, I arrived at Akron with an emigrant car, intent of making a home on the great plains. On arrival at Akron a number of wagons loaded with wheat from the Thurman section were lined up in front of Kinchloe's livery barn, waiting for the day to break and to unload. Wheat was selling at 35¢ per bushel, after this forty-five mile haul and had to be scooped onto the freight car by the farmers.

I asked if the crop was very good, the answer was "no." Wheat only made 20 bushels this year; oats 25 bushels and barley forty. As I came from Eastern Nebraska, I said that is considered a good crop with us, to which they answered, last year (1891) was good, we got 40 bushel wheat; 50 bushel oats and 60 of barley. I said that was wonderful, but alas, how deceitful this country acted. 1893 drought coupled with a financial panic, crops a total failure, no returns from one hundred and thirty acres, mostly plowed and seeded. 1894, drought again, with a grasshopper invasion, following in 1895, this year being very favorable up to a few days before harvest. As the wheat was commencing to turn, at noon one day, as I about to enter the house for dinner, I looked at a new board horse barn I built and behold, it was the color of a sod building. Upon investigation I found that the cause was a complete stucco formation of grasshopper, that had descended for their dinner. Yes, my new set of harness seemed to be their choice dessert. I had to remove them to the house and put them under the bed. Yes, the wheat would have made 25 bushels at noon, was reduced to three bushels per acre, half of which was given for the seed used, this being my argument with Goerge Kenny, who ran the flour and food store.

It is getting too far from my subject so I must return. About this time Hon. Lafe Pance, member of Congress for Colorado, sent some agricultural year books for the year 1890, which was also a dry year, giving results of an experiment conducted at Garden City, Kans., giving details of the method of dust mulching to hold moisture. The results were remarkable. I then became a student of dry land agriculture and read everything within my reach on this subject.

I saw the results of former droughts where homes had been abandoned some with improvements costing three thousand dollars, I could say with the poet change and decay in all around that I see.

I learned from the settlers that this was the third attempt at settling the plains, therefore I reasoned is it fair for the government to permit this ground to be homesteaded for agricultural purposes, if it is not adapted for such purpose, about this time 1905, I received a year book from the Hon. Robert E. Bonyng, our representative in Congress, in which the Honorable Secretary of Agriculture advocated the establishment of Experiment Stations at various points throughout the semi-arid belt. I concluded therefore to ask for such a station at Akron, as it was centrally located east and west and also north and south, of the great plains and east of the Rocky Mountains. I wrote to the Honorable Robert Bonyng to take the matter up with the Secretary of Agriculture. His reply was, you fellows have made no provisions by appropriations for such purpose, but if you will see Hon. E. C. Chilcott, of the Bureau of Plant Industry, you may find a way out. Mr. Chilcott replied, yes, we have a small amount of money available for experiments under the Hatch Act, for experimental purposes and improvements, but none for the purchase of site, fences or new buildings, so Mr. Chilcott and Mr. Bonyng wrote me of the conditions. I answered we could likely secure the site and that it would cost about \$3,000 to put necessary improvements. Mr. Chilcott wrote to Mr. Bruncker, "It is up to you people to raise the \$3,000 if you want that station." I showed this letter to August Muntzing, who became interested at this time. He answered, impossible, why we have only 300 voters (men) in this county, we cannot make it. I suggested as he was Railroad Attorney for the C. B. & Q., that we write the General Manager Mr. Holdredge and ask for one thousand dollars. Upon writing Mr. Holdredge, he answered if the station is established on our lines we will give \$1000 to this project.

We then asked the Empire Ranch and Cattle Company who were interested in two hundred quarter sections of land here and in Yuma county, that was purchased by then for 50 percent of the taxes due on them, around \$25 dollars per quarter section, upon being shown this was a good investment for them they responded with a pledge of \$500.

We then called a meeting to arrange for future pledges at which the business men and banks pledged their support. Mr. Art Mitchell, securing the amount in pledges I notified E. C. Chilcott that we were ready, we called another meeting which he attended. We showed him our pledges. He said that all looks very well, but remember

Appendix 3, Letter from F.A. Coffman, Bureau of Plant Industry, Office of Cereal Investigations

BRIEF RÉSUMÉ OF THE 10 YEARS OF CEREAL EXPERIMENTATION AT AKRON FIELD STATION

The past season completed a period of ten years during which investigation with cereal crops have been carried on at Akron Field Station, Akron, Colorado. It is, therefore, thought well to submit at this time a brief review of the results secured during this period. Ten years of experimentation are usually considered to constitute a period of sufficient length from which to draw conclusions of a fair degree of accuracy.

The development of the Akron Field Station, has indeed been marked. In 1907, there were but three buildings on the station farm and the amount of machinery and other equipment was very limited. Today there are eight buildings which are occupied by the personnel and equipment of the Offices of Dry-land Agriculture and Cereal Investigations, and there are two other buildings belonging to the Office of Alkali and Drought Resistance. The increased number of buildings but gives an idea of the station's growth. Only one building built prior to 1907 still remains standing. This building has been considerably improved. Besides the increase in number and size of buildings on the station, there have been numerous other improvements which greatly add to the convenience and pleasantness of the surroundings. A few of these are: the installation of water, sewage and electric lighting systems; the growing of shade-trees, orchards and shrubs; the laying of concrete walks and the construction of graveled drives. The increase in the character and amount of machinery, and kindred equipment for experimental purposes, has in every particular kept pace with the general improvement of the station. With this increase in room, machinery and other equipment, together with the improved surroundings, the investigations with cereal crops can now be conducted much more easily, and pleasantly than it would have been possible to do ten years ago.

The Akron Field Station is operated by the Office of Dry-Land Agriculture. The cereal experiments are conducted by the Office of Cereal Investigations in cooperation with the controlling office. Prior to 1910, Mr. J. E. Payne was superintendent of the station. He resigned, and in March 1910, Mr. O. J. Grace became superintendent. Mr. Grace has been superintendent of the station for practically eight years and the growth and improvement of the station are much to his credit.

Four different men had been in charge of the Cereal Office experiments prior to February, 1917. Mr. Wilson G. Shelley, who started the work, was in charge from March 1906, until the end of February, 1911. Mr. Clyde McKee was then appointed Scientific Assistant and placed in charge. He retained the position until February 15, 1913. He then was succeeded by Mr. Charles H. Clark, who remained until transferred July 1, 1913, at which time Mr. George A. McMurdo was placed in charge. Mr. McMurdo left the service during the past February, and from then until July 12, the Cereal Office experiments were conducted by the Office of Dry-Land Agriculture. The writer arrived at Akron July 12, 1917 to take over the cereal experiments.

The objects with which the cereal experiments are being conducted at Akron are:

1. To determine the best crops, varieties and varietal strains for this section of Colorado;
2. To improve these varieties by selection and breeding, and;
3. To determine the best cultural methods for cereal production in eastern Colorado.

With these objects in view, varietal seeding-rate and seeding-date tests have been conducted in field plats, and selection and breeding experiments have been carried out in the nursery each year. Experiments have been conducted annually with nearly all classes of cereal crops. A total of between 12,000 and 15,000 tests have been made during the past ten years by the Cereal Office at Akron. The number of tests has varied from year to year, but the number of field plats has gradually increased from 80 in 1908 to 315 in 1915. The past year but 293 field plats were sown. The smaller number was due to the absence of a cereal man during the planting season.

U.S Department of Agriculture Bulletin No. 402, gives a complete general description and history of the experimental work with cereals at the Akron Field Station up to and including the crop season of 1915. This résumé will simply present totals and averages for the ten-year experiments. Experiments conducted for periods of less than ten years have not been included in this review. Tables giving the climatological data of the Akron Field Station for the past ten years will be found in this report under the heading, "General Seasonal Conditions."

During the past ten years at Akron, the winter wheat has out-yielded the spring wheat by an average of over two bushels per acre annually. The average for the ten-year period, of five varieties of winter wheat was 20.8 bushels per acre. The average of seven varieties of spring wheat during the same period was 17.6 bushels. The difference is 2.2 bushels per acre in favor of the winter wheat. The highest yielding variety of winter wheat grown at Akron for the past ten years, has been Kharkov, C. I. No. 1583. This variety has surpassed the other winter wheats by an average of over one bushel to the acre.

Appendix 4, Letter from E.C. Chilcott, Bureau of Plant Industry

September 23, 1926.

Professor Alvin Kezer,
Fort Collins, Colorado.

My dear Kezer:

Replying to yours of the 16th inst., I submit the following concerning my personal relations to the establishment of the Akron Field Station.

I was called to Washington by Secretary Wilson and placed in charge of the investigational work in dry land agriculture in the Great Plains on July 1, 1905. I spent most of my time during the fiscal year 1905-6 in traveling over the Great Plains and getting in touch with the investigators at the 10 State Experiment Stations of the States lying wholly or in part within that area, and in looking for locations for prospective field stations that would be representative of the various sections of the Great Plains. I started out with and have maintained the fixed determination to do all within my power to have these field stations located where they would best serve the farmers of the region, rather than the politicians, or the land speculators. I met with a most hearty response from the Experiment Station men, who nearly all expressed a desire to cooperate. In many instances, however, they did not have the necessary funds or the authority from their governing boards to make any financial contribution to such cooperative work. It, therefore, became necessary in such instances to establish, what became known as independent field stations; that is stations maintained and managed by the U. S. Department of Agriculture, independently of the State Experiment Stations, so far as fiscal relations were concerned. This did not, however, prevent most cordial support and scientific cooperation in planning and developing investigational work of these stations; and later on actual financial cooperation. Such was the case of the Akron Field Station.

About February 10, 1907, I received from Dr. B. T. Galloway, then Chief of the Bureau of Plant Industry, a copy of a letter from the Honorable Robert W. Bonyng, Representative in Congress from the State of Colorado, enclosing Dr. Galloway's reply to the same; and, also a copy of a letter from Mr. James Brunker, a farmer living at Brunker, about 10 miles southwest of Akron, Colorado, accompanied by a petition from 67 residents of Washington County Colorado, copies of which are enclosed herewith. A copy of Dr. Galloway's letter of February 21, 1907, to the Honorable Robert W. Bonyng, together with Mr. Brunker's letter to Dr. Galloway of February 19 and my reply to it are also enclosed. Thus began a correspondence between Mr. Brunker and myself that extended over some 12 years or more.

During the calendar year 1907, I was in the field most of the time, and often visited Denver, Fort Collins, and Akron. I had several interviews with Director Carpenter and Professors Carlisle, and Olin, but was unable to perfect any satisfactory plans for cooperative work at Akron. I, therefore, decided that if a field station was to be established in northeastern Colorado, it must be an independent station under the control of the U. S. Department of Agriculture. Our funds were limited, and we had no authority to use any of them for the purchase of land. I, therefore made a proposition to the residents of Washington County, that, if they would purchase and deed to the Government a suitable tract of land, which I should select and furnish \$3000 for buildings and other equipment, the Department of Agriculture would establish and operate a field station near Akron, Colorado. James Brunker and August Muntzing, then attorney for the C B & Q railroad, were the leaders in this movement with whom I came most closely in contact, but there were other citizens of Akron and other parts of Washington County who rendered valuable service in making the establishment of the Akron Field Station possible.

As a result of the activities of these men, the County Commissioners of Washington County, Colorado, deeded to the United States of America, on the 3rd day of May 1906, a tract of land containing 66 acres, more or less, described as follows: All that part of SE ¼ Sec. 12, Township 2, north of range 52 west, 6th PM, lying north of the B and M railroad right of way.

The trees best adapted for wind breaks and shelterbelts, and the fruits best adapted to the farm orchard have been determined.

The use of sheep for the utilization of crop residues on the dry farm has been investigated. The water requirement of plants in a dry climate has been determined.

I have not included the cooperative work with the Colorado State Experiment Station, nor the acquisition of the additional land provided by it, as you can supply this better than I can.

I consider that the fact that the Akron Field Station is one of the 24 field stations conducted by the Office of Dry Land Agriculture adds very greatly to the value of the investigations carried on there. It participates in the benefits derived from the comparisons of the results obtained from all these stations.

The manuscript of a bulletin entitled "The Relations between Crop Yields and Precipitation in the Great Plains," is now in the Government Printing Office, and will soon be issued. I believe that it is by far the most valuable contribution yet made by this office to the fundamental facts concerning the agricultural possibilities of the Great Plains.

I am sending you some bulletins which you undoubtedly have, but which may not be available for your use for this purpose.

I wish to call to your attention particularly, to the two illustrations which occur on pages 3 and 4 of the Bulletin No. 1287. Figure 1 shows the buildings constructed from the \$3000 raised by the citizens of Washington County.

Very truly yours,

E.C. Chilcott

Senior Agriculturist in Charge

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During the period between 1910 and 1920 Drs. Briggs and Shantz did their then classic work with the water requirement of the principal crops growing or likely to be grown in the High Plains environment. Also, there were personnel at the Station connected with other research offices of the then Department of Agriculture. It also was a building and modernization period. The office building, as modernized at present, was erected. The old barn was raised and the presently standing barn was erected. The lower machine and implement shed was erected.

The south residence building was the old Brigs and Shantz laboratory. There was the Office of Dry Land Agriculture, then they were called offices, which was the operating office of the Akron Station. The Cereal Office was the most consistent in their cooperative effort. Mr. Coffman was Cereal Representative when I arrived in 1920. He had taken over the Cereal Office cooperative work in 1918 or 1919. He was the keen-eyed researcher who saw Brunker and Trojan oats in the old Burt 916 oats and isolated and purified them. He saw the white heads in Blackhull 878 and started several head rows that in 1938 was isolated and named, the white seeded, Munsing. He saw the wonderful possibilities of the very susceptible kernel smut susceptible White Smyrna 2642 and saved several smut-escaping heads. This line produced the kernel smut-escaping line of Vance, about 1935.

This Coffman and his wife had living quarters in the upstairs of the office building. In 1921 he succeeded in getting his office to allot some \$2000 for remodeling, and making livable, the south residence which, as stated, was the old shell of the Briggs and Shantz laboratory. The inside walls had never been covered, and the top eaves line had sagged down in the middle.

The old superintendent's house where Grace had lived and where my wife and I moved in was so badly used by the then years of service, so when Coffman was transferred in 1924 off the station to Office headquarters in Washington, my wife and I moved in, as the much more livable quarters on the Station.

Mr. Grace had moved the old Shantz and Briggs bunk house to the spot where the present laboratory is situated, just west of the superintendent's residence. This was useful as a laborer quarters during the early horse and buggy days.

Mr. E. J. Maynard was the active Animal Husbandry representative in supervising the sheep grazing experiment. He found the State Representative body sympathetic toward research out on the Eastern Plains and obtained considerable money for such work. Between 1928 and 1932 they did considerable work on fattening hogs and lambs on typically grown Plains feeds. We fattened lambs satisfactorily and cheaper than they could be fattened on irrigated land feeds. Lamb fattening on the Plains feeds has continued, but on a minor scale. Chief endeavor now is fattening them on winter wheat pastures, and a research problem developed as protein poisoning. The hog fattening study proved Proso, or Hershey, a superior hog fattening ration, and yet the Hershey, or Proso, feed price still logs below barley as a rule.

This work proved so popular and grazing land so scarce that in 1926, Mr. Maynard brought Mr. Charles H. Lory, President of Colorado A & M College, down and showed him the 160 acres of sod land across the railroad. Dr. Lory then said he would recommend to his board the purchase of the land. This was truly and rightly a deed to the State Agricultural Experiment Station. This too was leased to the government and increased the Station's land holdings to 386-2/3 acres, more or less.

When I came to the Station in 1920, there was no modern water or sewage disposal system. This problem was taken up with the Washington Office of Dryland Agriculture and money was allotted for this project which was started in 1921 and completed in 1922. By that time, it was evident that the south well was the only reliable one of the three wells on the Station. Tests showed that this well capable of producing 280 gallons per hour for 10-hour periods. There was one Kewaunee 1,000gallon pneumatic tank present, and I prevailed on securing another. It was then buried in the ground and hooked to the wind mill deep well pump. This well soon pumped dry of water so that an excessive amount of air was pumped into the tank. By the time the pressure was built up to shut the pump off, the tank pressure was terrific. It was not unusual for a cup to be blown out of hand in attempting to collect a drink from one of the spigots. This new tank was also buried into the ground by the south well, where it stands now. At that time, the cement pump house was established and the first pump there was a Kewaunee gas engine pumping unit. This would cut out when the pressure was up, but one had to watch and when the pressure was low, go over and start the gas engine pumping unit. A Kewaunee equipped septic tank and distributing system was established in 1922, the sewer lines of 4-inch tile layed in the same trenches with the water lines. Excessive water line knocking was still experienced and the same excessive water pressure was present at the spigots. Soon thereafter, the wind mill was

During the thirties, the Station had good cooperation with the W.P.A. setup. The south house was then jacked up and solid and permanent foundations constructed. It was only incidental that a full basement was also constructed. The buried pneumatic water tank was dug out and a cement wall and cover placed over the tank. Both pneumatic water tanks are now where they can be painted and protected from outside rust depredations. The bunk house was gone over and inside entrance to the basement provided. The station bought half the material and the W.P.A. the other half and they built the garage. Then, the government would not build garages and it was constructed as an implement shed and later just incidentally used as a garage. The north or mess house was next in line to receive said permanent foundation, but the W.P.A. was disbanded before this could be done.

In order to get the garage, we had to provide so much work for the W.P.A. groups. Three cess pools were built and the chart and the boys, Bob and Lou, know how to find them. They were constructed to furnish drainage disposal to basement floor drains. These may occasionally need to be pumped out and the one taking care of the office and the south house may need to be enlarged.

The new or enlarged septic tank should be pumped out about every three years. Bob and Lou know where this is and perhaps this year the sludge needs to be removed. Proper removal of the sludge prevents clogging up the siphon chamber of the septic tank and causing trouble. These septic tanks work like a charm, but they do need occasional removal of accumulated sludge. No permanent residences now render these periodic cleanings less frequently. This, however, might be a good year to see how much sludge has accumulated. Carryover of sludge not only clogs the siphon chamber but going into the distribution systems soon fills the soil. Clear water is all that should go into the distribution system. Morrie Cox knows all this and maybe he has already seen about the cleaning out.

Under separate cover, a survey map is being sent pertaining to the whole of Akron Station particularly in connection with the purchase of the land across the tracks.

JFB:CH

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